

Appln. No. Serial No. 09/707,599  
Amdt. Dated 7/13/05  
First Response in Appln, Reply to Office Action of 1/13/2005  
Page 2 of 13

### **AMENDMENTS TO THE CLAIMS**

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method of analyzing pattern information pieces each being a set of information units, each of the information units ~~and pattern information pieces~~ having a scalar representing a specific characteristic as an attribute, the method comprising the steps of:

calculating an activity level of each of the pattern information pieces according to the ~~scalars of the information units~~ scalars of the pattern information pieces and scalars of a set of information units associated with an input pattern information piece;

repressing a predetermined number of times the calculated activity level of each pattern information piece according to repression rules that are determined in consideration of the ~~other activity levels of the other~~ activity levels of the other pattern information pieces; and

generating a new set of information units each having a new scalar according to the ~~scalars of the information units~~ scalars and repressed activity levels of the pattern information pieces.

Appln. No. Serial No. 09/707,599

Amdt. Dated 7/13/05

First Response in Appln, Reply to Office Action of 1/13/2005

Page 3 of 13

2. (Currently amended) A method of analyzing input information, comprising the steps of:

calculating an activity level of a partial or whole set of corresponding cells of ~~each~~ a plurality of stored patterns with respect to an input pattern, each cell of the input and stored patterns having a scalar representing a specific characteristic as an attribute; and  
for each stored pattern,

~~repressing the calculated activity level of each stored pattern~~ a predetermined number of times according to repression rules that are determined in consideration of the ~~other~~ calculated activity levels of the other stored patterns; and

creating a new set of cells each having a new scalar according to the ~~cell~~ scalars of the cells and ~~repressed activity levels of each stored pattern~~.

3. (Currently amended) The method of claim 2, further comprising the step of:

generating a resultant set of cells each having a resultant new scalar ~~by collecting based on the created cell new sets of cells of a group each of the stored patterns, or~~ ~~generating a scalar by collecting the repressed activity levels of a group of the stored patterns.~~

Appln. No. Serial No. 09/707,599  
 Amdt. Dated 7/13/05  
 First Response in Appln, Reply to Office Action of 1/13/2005  
 Page 4 of 13

4. (Currently amended) A method of analyzing input information, comprising the steps of:

converting an input pattern consisting of cells into a converted pattern consisting of cells and storing the converted pattern;

calculating an activity level of a partial or whole set of cells of each of at least one of a plurality of stored patterns with respect to the converted pattern according to cell values of the stored and converted patterns;

repressing each of the calculated activity levels a predetermined number of times according to repression rules that are determined in consideration of a negative repression coefficient and the ~~other~~ calculated activity levels of other ones of the stored patterns to generate a repressed activity level;

generating a new cell value for each cell of the at least one stored pattern according to the cell value and a corresponding one of the repressed activity levels; and

~~composing, after each repressing step, a new cell value for each cell according to a present cell value and a corresponding one of the repressed activity levels, or composing a new scalar according to the repressed activity levels; and~~

providing the new resultant cell values based on the new cell values ~~or the new scalar~~ as a response pattern ~~or a response scalar~~ for the input pattern.

5. (Original) The method of claim 4, wherein:

the repressing step changes each activity level  $A(i)$  by  $\delta A(i)$  according to a repression coefficient  $W(i)$  as follows:

$$\delta A(i) = W(i) \{ \psi(A(1)) + \psi(A(2)) + \dots + \psi(A(i-1)) + \psi(A(i+1)) + \dots + \psi(A(M)) \}, \text{ and}$$

$$\psi(x) = \begin{cases} x & : x > 0 \\ 0 & : \text{else.} \end{cases}$$

Appln. No. Serial No. 09/707,599  
Amdt. Dated 7/13/05  
First Response in Appln, Reply to Office Action of 1/13/2005  
Page 5 of 13

6. (Currently amended) A method of generating patterns from input information, comprising the steps of:

entering an input pattern into a network of elements arranged at predetermined intervals, each of the elements directing an input impulse toward a next element, except during a refractory period which exists and thereafter, rejecting to direct input impulses toward the next element until predetermined conditions are met; and

generating a response rule corresponding to the input pattern according to routes formed by the elements in response to the input pattern, wherein the refractory period of one of the elements is changed in response to a pattern of stimulations to the element, intervals of stimulations to the element, or a state of the element.

7. (Currently amended) The method of claim 6, ~~further comprising the step of:~~  
providing wherein the an input pattern is provided with a depth along a time axis to form a set of input patterns, the set of input patterns being used to form new input patterns.

8. (Currently amended) The method of claim 7, further comprising the steps of:  
dividing the set of input patterns into blocks;  
shifting the blocks in predetermined directions according to predetermined rules; and  
combining the shifted ~~patterns~~ blocks to form the new input patterns.

9. (Cancelled).

Appln. No. Serial No. **09/707,599**  
 Amdt. Dated 7/13/05  
 First Response in Appln, Reply to Office Action of 1/13/2005  
 Page 6 of 13

10. (Currently amended) An apparatus for analyzing input information, comprising:  
 preprocessing means for converting an input pattern consisting of cells into a converted pattern consisting of cells and storing the converted pattern;  
 activity level calculating means for reading at least one of a plurality of stored patterns and calculating an activity level of a partial or whole set of cells of each of the read patterns according to cell values of the read and converted patterns;  
 mutual repressing means for repressing each of the calculated activity levels a predetermined number of times according to repression rules that are determined in consideration of a negative repression coefficient and the ~~other~~ calculated activity levels of the other read patterns to generate a repressed activity level;  
generating a new cell value for each cell of the at least one stored pattern according to the cell value and a corresponding one of the repressed activity levels; and  
~~composition means for composing, after each repressing process, a new cell value for each cell according to a present cell value and a corresponding one of the repressed activity levels, or composing a new scalar according to the repressed activity levels; and~~  
 output means for providing the new resultant cell values based on the new cell values ~~or the new scalar~~ as a response pattern ~~or a response scalar~~ for the input pattern.

11. (Original) The apparatus of claim 10, wherein the mutual repressing means changes each activity level  $A(i)$  by  $\delta A(i)$  according to a repression coefficient  $W(i)$  as follows:

$$\delta A(i) = W(i) \{ \psi(A(1)) + \psi(A(2)) + \dots + \psi(A(i-1)) + \psi(A(i+1)) + \dots + \psi(A(M)) \}, \text{ and}$$

$$\psi(x) = \begin{cases} x & : x > 0 \\ 0 & : \text{else.} \end{cases}$$

Appln. No. Serial No. 09/707,599  
Amdt. Dated 7/13/05  
First Response in Appln, Reply to Office Action of 1/13/2005  
Page 7 of 13

12. (Currently amended) An apparatus for analyzing pattern information pieces each being a set of information units, each of the information units ~~and pattern information pieces~~ having a scalar representing a specific characteristic as an attribute, comprising:

activity level calculating means for calculating an activity level or a similarity level of each of the pattern information pieces according to combinations of the scalars of a part or whole of the information units of the pattern information pieces and scalars of a set of information units of an input pattern piece;

mutual repressing means for repressing a predetermined number of times the calculated activity level of each pattern information piece according to repression rules that are determined in consideration of the ~~ether~~ activity levels of the other pattern information pieces; and

generation means for generating a new set of information units each having a new scalar, according to the scalars of the information units and the repressed activity levels.

13. (Currently amended) The apparatus of claim 12 further comprising: composition means for generating a resultant set of cells each having a new resultant scalar ~~by collecting based on the created cell new sets of information units of a group of the stored patterns, or generating a scalar by~~  
~~collecting the repressed activity levels of a group of the stored patterns.~~

14. (Currently amended) An apparatus for analyzing input information, comprising:  
activity level calculating means for calculating an activity level of a partial or whole set of corresponding cells of ~~each~~ a plurality of stored patterns with respect to an input pattern;

mutual repressing means for repressing the calculated activity level of each stored pattern a predetermined number of times according to repression rules that are determined in consideration of the ~~ether~~ activity levels of the other stored patterns; and

composition means for creating a new pattern according to the repressed activity levels and the stored patterns.

Appln. No. Serial No. 09/707,599

Amdt. Dated 7/13/05

First Response in Appln, Reply to Office Action of 1/13/2005

Page 8 of 13

15. (New) The method of claim 4, wherein  
one of a plurality of similarity levels of the cells for a focal range of one cell of the  
partial or whole set of cells is calculated as follows:

$$S_H(i, k) = \sum_{L_k \in H_{sk}} P(k) \cdot T(i, k) / N_k.$$

wherein  $S_H(i, k)$  represents the similarity level,  $L_k$  represents a cell contained in a  
given similarity range  $H_{sk}$ ,  $P(k)$  represents a cell value in the input pattern,  $T(i, k)$  represents  
a cell value in trace  $i$ , and  $N_k$  represents a number of related cells.

16. (New) The method of claim 15, wherein  
a repression range is set for the focal range and a new pattern is calculated as follows:

$$C_H(j) = \sum_{i=1}^M \sum_{L_k \in \eta} \Psi(A_H(i, k)) \cdot T(i, k).$$

wherein  $C_H(j)$  represents the new pattern,  $L_k$  represents a cell contained in a given  
repression range  $I_j$ ,  $A_H(i, k)$  represents an activity level of a cell  $k$  in trace  $i$ ,  $T(i, k)$  represents  
a cell value in trace  $i$ , and  $\psi(x) = \begin{cases} x & : x > 0 \\ 0 & : else. \end{cases}$

17. (New) The method of claim 4, wherein  
a similarity level of a cell in a similarity range containing a focal range of one cell of  
the partial or whole set of cells is calculated.

18. (New) The method of claim 17, wherein  
the similarity level of a cell in the first range depends on a distance from the focal  
range to the cell.

Appln. No. Serial No. 09/707,599

Amdt. Dated 7/13/05

First Response in Appln, Reply to Office Action of 1/13/2005

Page 9 of 13

19. (New) The method of claim 17, wherein  
a repression coefficient applied to a cell in a repression range containing the focal  
range depends on a distance from the focal range to the cell.
20. (New) The method of claim 2, further comprising:  
generating repressed activity levels after each iteration of the repressing step, wherein  
the repressed activity levels are based on the activity levels of each of the stored patterns.
21. (New) The apparatus of claim 12, further comprising composition means  
configured to generate repressed activity levels after each repression, wherein the repressed  
activity levels are based on the activity levels of each of the pattern information pieces.